

A Bacteriological Study of Dacryocystitis

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ABSTRACT

Introduction: Dacryocystitis is an inflammation of the lacrimal sac and duct. It is an important cause of ocular morbidity, both in children and in adults.

Aims: The aim of this study was to isolate, identify and to determine the antibiotic susceptibility pattern of the bacterial isolates which were found in cases of dacryocystitis.

Setting and design: Prospective study.

Methods: 83 cases of dacryocystitis were studied over a period of one year. The samples from the lacrimal sac and the conjunctiva were collected by applying pressure or lacrimal syringing. The isolates were identified by conventional methods and their antibiotic susceptibility pattern was established.

Statistical Analysis: The results were analyzed by using mean, median and the Chi-square (χ^2) test.

Results: Chronic dacryocystitis (51) was the most common type of dacryocystitis as compared to acute (20) and congenital dacryocystitis (9). Females were affected more than the males. *Staphylococcus aureus* (26), *Streptococcus pneumoniae* (22) and *Pseudomonas aeruginosa* (14) were the most common isolates which were found. The gram positive isolates were most sensitive to vancomycin (100%), tobramycin and linezolid (99.36%). The gram negative organisms were most sensitive to tobramycin and gentamicin (100%), followed by cefepime (98.79%) and chloramphenicol (97.14%).

Conclusion: Chronic dacryocystitis was the most common type of dacryocystitis than acute dacryocystitis. Gram positive organisms were most commonly isolated than gram negative organisms.

Key Words: Dacryocystitis, Epiphora, *Staphylococcus aureus*, *Pseudomonas aeruginosa*

INTRODUCTION

DACRYOCYSTITIS is an inflammation of the lacrimal sac and duct. It may be congenital or acquired. Acquired dacryocystitis assumes two main forms: acute and chronic [1]. There are distinct patterns of geographical variation in terms of the aetiology, according to the local climate in infective keratitis and also in microbial conjunctivitis. Hence, an understanding of the regional aetiological agents is important for the management of this disease. The knowledge of the bacteriology of chronic dacryocystitis would contribute to the choice of effective antimicrobial agents and it would also help in reducing the unnecessary load of anti-microbial agents [2]. During the past years, only few studies had been conducted on the bacteriology of dacryocystitis. Hence, this study was done.

MATERIALS AND METHODS

A total of 80 clinically diagnosed cases of dacryocystitis, who attended the Ophthalmology Out-Patients Department at the Sree Siddhartha Medical College Hospital and District Hospital, Tumkur, India were studied over a period of one year.

Inclusion criteria: Clinically diagnosed cases of dacryocystitis were included in the study.

Exclusion criteria: The patients who had received either topical or systemic antibiotics for the past one week during their visit to the hospital were excluded.

An informed consent was obtained from all the patients who were enrolled. The specimens were collected with the help of an ophthalmologist. The surrounding area was aseptically cleaned,

to avoid contamination from the surface microorganisms and the samples were collected in two sterile cotton swabs from the lacrimal sac, either by applying pressure over the lacrimal sac and allowing the purulent material to reflux through the lacrimal punctum or by lacrimal syringing. The sample from the refluxing material was collected by ensuring that the lid margins or the conjunctiva were not touched. One swab was inoculated immediately on plates of MacConkey's agar, 5% Sheep Blood agar and Chocolate agar and another swab was used for gram staining. The stained smear was screened for the presence or absence of pus cells and bacteria. The isolated organisms were identified by using standard procedures [3]. The sensitivity of the organisms was tested by the Kirby-Bauer disc diffusion method as per the Clinical and Laboratory Standards Institute (formerly NCCLS) guidelines [4].

Chi-square (χ^2) distribution was used to test the qualitative distribution. A p (predictive) value of <0.05 was considered as a significant association between the variables which were tested.

RESULTS

Out of the 86 samples which were obtained from 80 cases of clinically diagnosed dacryocystitis over a period of one year, 80 samples were culture positive and 6 samples were culture negative. Both eyes were involved in 8 (10%) cases, only the left eye was involved in 40 (50%) cases and the right eye was involved in 32(40%) cases, as shown in [Table/Fig-1a].

In this study, females were affected more i.e., 56 (70%) as compared to males 24 (30%). The male to female ratio was 2.3:1. In both congenital dacryocystitis (7.5%) and acquired dacryocystitis

(62.5%), females were affected more. This study showed the highest number of dacryocystitis cases among the people who were in the age group of 4–60 years (35%), followed by those in the age group of 31–45 years (27.5%), those in the age group of 61 years and above (13.75%), those in the age group of 16–30 years (12.5%) and those in the age group of 0–15 years (11.25%). Chronic dacryocystitis was the most common type of dacryocystitis in the present study, comprising of 51 cases (63.75%) as compared to acute dacryocystitis 20 cases (25%) and congenital dacryocystitis 9 cases (11.25%), as shown in [Table/Fig-1b]. In our study, 40 (50%) cases showed only epiphora and 32 cases (40%) showed epiphora with discharge (mucous or mucopurulent or purulent) as their major symptoms. Only 8 cases (10%) presented with swelling and redness.

Out of the 80 samples which were collected, 66 samples (82.5%) yielded a single organism and 14 (17.5%) yielded mixed organisms i.e., 94 isolates altogether. 61 (64.9%) isolates were gram-positive bacteria and 33 (35.1%) isolates were gram-negative bacteria. The organisms which were isolated are shown in [Table/Fig-2] and [Table/Fig-3]. The most common gram-positive isolate which was identified was *Staphylococcus aureus* 26 (27.65%) and the most common gram-negative isolate which was identified was *Pseudomonas aeruginosa* 14 (14.9%).

Streptococcus pneumoniae was the predominant gram-positive organism in acute and congenital dacryocystitis and *Staphylococcus aureus* was the predominant gram-positive organism in chronic dacryocystitis. *Pseudomonas aeruginosa* was the most common gram-negative isolate in both congenital and acquired dacryocystitis. The antibiotic sensitivity test was done for all the isolates. The sensitivity pattern is as shown in the [Table/Fig- 4 & 5].

DISCUSSION

Dacryocystitis, as a disease entity, is known since ancient times. It is an important cause of ocular morbidity, both in children and adults. Hence, it requires special attention with respect to the initiation of the appropriate treatment at the earliest. The pattern of the relative incidence of various factors varies in different studies. In our study, females were found to be commonly affected in congenital and acquired dacryocystitis, with a male to female ratio of 2.3: 1, which correlated with the findings of Badhu B et al., [5] (2.1: 1). The predilection in females may be due to the smaller nasolacrimal canal diameter in females than in men and hormonal factors [6]. Most of the females came from the middle and the lower income groups, who used wood and dried cow dung for cooking, which gave away a lot of smoke particles which could have settled down in the conjunctival sac, entered the nasolacrimal duct through tears and in turn had blocked the nasolacrimal duct. Kajal which was artificially prepared in the house by the women may have been contaminated with organisms, which when applied on the margin of the eyelids, may have infected the lacrimal sac. Females blew the nose infrequently as compared to the males, which may have caused stagnation of the nasolacrimal duct secretions, leading to infection [2]. The stagnation of tears due to the obstruction and the resultant accumulation of the debris in the lacrimal sac together act as the potential nidus for the organisms to propagate within the sac, causing inflammation, hyperaemia, oedema and hypertrophy of the mucosal epithelium. Accumulation of mucoid and mucopurulent exudates causes the sac to dilate, ultimately leading to a pyocele [7].

In our study, the involvement of the eye was mainly unilateral (90%), either the right or the left eye and there were also some bilateral

Sl No.	Eye affected	No. of cases		
		Males No. (%)	Females No. (%)	Total No. (%)
1	Right	12(15)	20(25)	32(40)
2	Left	10(12.5)	30(37.5)	40(50)
3	Bilateral	2(2.5)	6(7.5)	8(10)
Total		24(30)	56(70)	80(100)

[Table/Fig-1a]: Distribution of Eye affected versus Sex distribution

Sl No.	Clinical type	No. of cases		
		Males No. (%)	Females No. (%)	Total No. (%)
1	Acute	5(6.25)	15(18.75)	20(25)
2	Chronic	16(20)	35(43.75)	51(63.75)
3	Congenital	3(3.75)	6(7.5)	9(11.25)
Total		24(30)	56(70)	80(100)

[Table/Fig-1b]: Type of dacryocystitis versus sex distribution.

$\chi^2 = 0.214$, P value = >0.05.

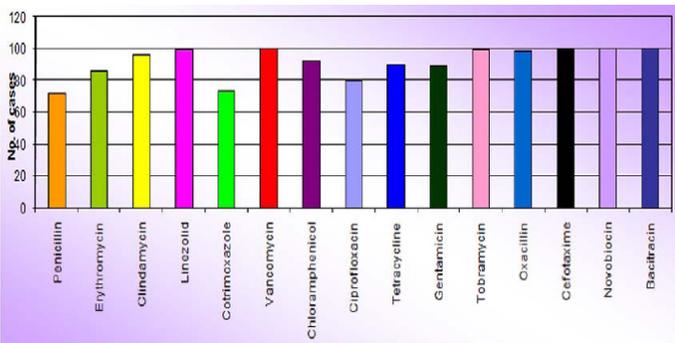
Sl. No.	Organisms	No. of Cases		Total No. (%)
		Congenital (10)	Acquired (84)	
1	<i>Staphylococcus aureus</i>	1	25	26 (27.65)
2	<i>Streptococcus pneumoniae</i>	5	17	22 (23.4)
3	<i>Staphylococcus epidermidis</i>	1	7	8 (8.5)
4	<i>Diphtheroids</i>	0	3	3 (3.2)
5	<i>Beta hemolytic streptococci</i>	0	1	1 (1.05)
6	<i>Streptococcus viridans</i>	0	1	1 (1.05)
Total		7	54	61 (64.9)

[Table/Fig-2]: Distribution of Dacryocystitis cases according to spectrum of Gram-Positive Organisms.

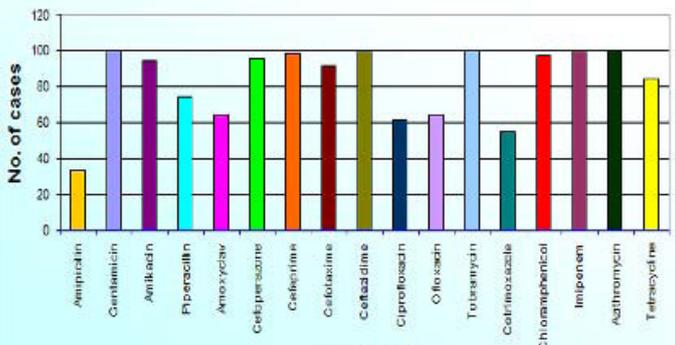
Sl. No.	Organisms	No. of Cases		Total No. (%)
		Congenital (10)	Acquired (84)	
1	<i>Pseudomonas aeruginosa</i>	2	12	14 (14.9)
2	<i>Klebsiella pneumoniae</i>	0	7	7 (7.45)
3	<i>Non-fermenting Gram negative bacilli</i>	0	5	5 (5.35)
4	<i>Haemophilus influenzae</i>	0	3	3 (3.2)
5	<i>Escherichia coli</i>	0	3	3 (3.2)
6	<i>Citrobacter freundii</i>	1	0	1 (1.05)
Total		3	30	33 (35.1)

[Table/Fig-3]: Distribution of Dacryocystitis cases according to spectrum of Gram-Negative Organisms.

(10%) cases. This correlated well with the findings of Ghose et al., [8] (90%:10%), There was a relatively high incidence of the disease on the left side (40%) as compared to the right side (32%). This correlated well with the findings of Brook I et al., [9], in which the left lacrimal sac was involved in 36 patients (58%). In general, the disease had predilection to the left side, especially in females,



[Table/Fig-4]: Antibiotic sensitivity pattern of Gram positive isolates



[Table/Fig-5]: Antibiotic sensitivity pattern of Gram negative isolates.

because of their narrow bony canal. The nasolacrimal duct and the lacrimal fossa formed a greater angle on the right side than on the left side [6].

In the present study, chronic dacryocystitis was the most frequently encountered clinical type 51 (63.75%), followed by acute dacryocystitis 20 (25%) and congenital dacryocystitis 9 (11.25%). This was probably because acute dacryocystitis invariably led to chronic dacryocystitis. A single organism was isolated in 66 (82.5%) cases and mixed organisms were isolated in 14 (17.5%) cases, which correlated with the findings of Kundu PK et al., [10] (82.5% and 10.5%) and Sainju R et al., [11] (81.82% and 18.18%). The mixed growth might be due to stagnation of the tear for a longer time, thus providing a better environment for the pathogenic organisms to get established by suppressing the normal flora [2].

The bacterial isolates have been changing from time to time and from place to place. Of 94 isolates, 61 (64.89%) were gram-positive organisms and 33 (35.11%) were gram-negative organisms. In congenital dacryocystitis, the most common gram-positive isolate which was identified was *Streptococcus pneumoniae* 5 cases (50%) and the most common gram-negative isolate was *Pseudomonas aeruginosa* 2 cases (20%), which correlated with the findings of Bareja U et al., [12]. In acquired dacryocystitis, the most common gram-positive isolate was *Staphylococcus aureus* (29.76%) and the most common gram-negative isolate was *Pseudomonas aeruginosa* (14.28%), which correlated with the findings of Briscoe D et al., [13] (13% and 22%). McCulloch [14] studied the origin of *Pseudomonas* in the conjunctiva in general and found that this organism may be present in the eye as a result of:

- A contaminated solution which was used as drops.
- Being a part of the flora of the normal conjunctiva.
- Being associated with *Pseudomonas* infections elsewhere in the body (otitis media, nose, mouth, palate, etc.).

The anti-microbial sensitivity pattern varies from community to community. This is because of the emergence of resistant strains as a result of the indiscriminate use of antibiotics. The gram-positive

isolates were most sensitive to vancomycin (100%), followed by tobramycin and linezolid (99.36%). The least sensitive antibiotic against the gram-positive organisms was penicillin (71.69%). The gram-negative organisms were most sensitive to tobramycin and gentamicin (100%), followed by cefepime (98.79%) and chloramphenicol (97.14%). The least sensitive antibiotic against the gram-negative organisms was ciprofloxacin (61.64%). In this study, the limitations were time and the number of patients. For better outcomes, a larger study population should be undertaken for a longer period of time, to know the bacteriology and to select effective drugs of choice for chronic dacryocystitis.

CONCLUSION

Most of the cases were culture positive, which highlighted the significance of this clinical condition for the ophthalmologists to specifically investigate for the presence of the symptom of nasolacrimal obstruction before planning any intraocular procedures.

The females of middle age and above had higher cases of dacryocystitis more than men. The left eye was involved more than the right eye. Chronic dacryocystitis was the most common type of dacryocystitis than acute dacryocystitis. Serous discharge was the commonest clinical presentation. Gram positive organisms were most commonly isolated than gram negative organisms. It may be so, that with the use of antibiotics, some well known bacteria had become less important as the causes of the disease, but that other organisms had taken their place, and the host parasite relationship seemed to have continued unabated.

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